

1 Claims

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3 1) A cartridge for use in a Surface Plasmon Resonance
4 sensor, the cartridge comprising an optical element
5 having a first surface and a mounting member for
6 supporting a sensing agent located on a second
7 surface of the optical element, the first surface
8 comprising a first means for directing a beam of
9 light incident on the optical element towards the
10 second surface at an angle of incidence to the second
11 surface that results in substantially total internal
12 reflection of the beam of light at an interface of
13 the mounting member and the second surface wherein
14 the cartridge further comprises a detachable channel
15 suitable for containing a fluid sample to be tested.

16

17 2) A cartridge as claimed in Claim 1 wherein the channel
18 locates on the second surface of the cartridge such
19 that the fluid sample contained within the channel
20 makes physical contact with the sensing agent.

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22 3) A cartridge as claimed in Claim 1 or Claim 2 wherein
23 the optical element further comprises a third surface
24 for the exit of beam of light from the optical
25 element wherein the third surface includes a second
26 means for directing the beam of light.

27

28 4) A cartridge as claimed in any of the preceding Claims
29 wherein the optical element comprises a material
30 having a first dielectric constant while the mounting
31 member comprises a material having a second
32 dielectric constant wherein the second dielectric
33 constant is of an opposite sign to that of the first
34 dielectric constant.

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2 5) A cartridge as claimed in any of the preceding Claims
3 wherein the first means for directing the light beam
4 comprises a focusing element for focusing the beam of
5 light to a line at the interface of the mounting
6 member and the second surface.

7

8 6) A cartridge as claimed in any of Claims 3 to 5
9 wherein the second means for directing the light beam
10 comprises a defocusing element.

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12 7) A cartridge as claimed in any of the preceding Claims
13 wherein the mounting member comprises a metal.

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15 8) A cartridge as claimed in any of the preceding Claims
16 wherein the optical element comprises an injection
17 moulded plastic material.

18

19 9) A cartridge as claimed in any of the preceding Claims
20 wherein the sensing agent comprises one or more
21 antibodies each antibody being suitable for binding a
22 pathogen.

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24 10) A cartridge as claimed in Claim 9 wherein the bound
25 pathogen is selected from the group comprising
26 Legionella, Escherichia coli, Salmonella, Bacillus
27 Anthracis, Yersinia Pestis, Lysteria,
28 Cryptosporidium, Variola virus, Picomaviridae
29 Aphovirus, Filoviruses, any plasticiser, steroid,
30 medicinal drug or illicit substance or any other
31 known fluid borne bacterium.

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1 11) A cartridge as claimed in Claim 9 or Claim 10 wherein
2 a protein substrate and a ligand is employed to bind
3 a biotinylated antibody to the metal.

4

5 12) A cartridge as claimed in Claim 11 wherein the
6 protein substrate comprises biotin.

7

8 13) A cartridge as claimed in Claim 11 or Claim 12
9 wherein the ligand comprises a protein selected from
10 the group comprising avidin, streptavidin and
11 neutravidin.

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13 14) A Surface Plasmon Resonance sensor comprising a light
14 source for generating a beam of light, a cartridge as
15 claimed in any of Claims 1 to 13, and a light beam
16 detection means wherein the employment of the
17 cartridge allows for the miniaturisation of the
18 sensor.

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20 15) A Surface Plasmon Resonance sensor as claimed in
21 Claim 14 wherein the light source comprises a diode
22 laser.

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25 16) A Surface Plasmon Resonance sensor as claimed in
26 Claim 14 or Claim 15 wherein the light beam detection
27 means comprises a detector and a data processing
28 means.

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30 17) A method of field detection of one or more pathogens
31 that comprising the steps of:

32 1) Selecting an appropriate cartridge for the
33 detection of one or more pathogens for use in a
34 Surface Plasmon Resonance sensor;

- 1 2) Calibrating the Surface Plasmon Resonance sensor;
- 2 and
- 3 3) Testing a fluid sample for the presence of one or
- 4 more of the pathogens;
- 5
- 6 18) A method of field detection of one or more pathogens
- 7 as claimed in Claim 17 wherein the selection of the
- 8 appropriate cartridge comprises locating the
- 9 cartridge with one or more appropriate antibodies for
- 10 binding with the one or more pathogens.
- 11
- 12 19) A method of field detection of one or more pathogens
- 13 as claimed in Claim 17 or Claim 18 wherein
- 14 calibration of the Surface Plasmon Resonance sensor
- 15 comprises:
 - 16 1) Irradiating a mounting member with a beam of light
 - 17 in the absence of the fluid sample; and
 - 18 2) Detecting a component of the beam of light
 - 19 reflected from the mounting member and storing the
 - 20 data as a reference signal;
- 21
- 22 20) A method of field detection of one or more pathogens
- 23 as claimed in Claim 17 to Claim 19 wherein the
- 24 testing of a fluid sample for the presence of one or
- 25 more pathogens comprises:
 - 26 1) Locating the fluid sample with respect to a
 - 27 channel;
 - 28 2) Connecting the channel to the cartridge;
 - 29 3) Irradiating the fluid sample with the beam of
 - 30 light;
 - 31 4) Detecting the beam of light reflected from the
 - 32 mounting member and storing the data as a sample
 - 33 signal; and